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NASA CR-

144553

ISC-00971

## 121.75 MHz BAND PASS FILTER

Job Order 17-060

(NASA-CR-144553) THE 121.75 MHz BAND PASS  
FILTER (Lockheed Electronics Co.) 14 p  
HC \$3.50 CSDL 09C

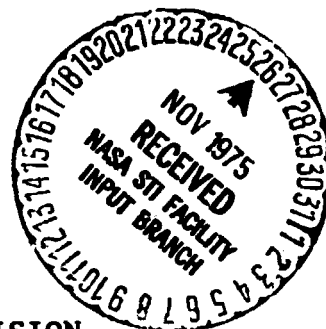
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G3/33 Unclass  
02603

Prepared By  
Lockheed Electronics Company, Inc.  
Aerospace Systems Division  
Houston, Texas  
Contract NAS 9-12200

For

SPACECRAFT SYSTEMS TEST OFFICE  
TRACKING AND COMMUNICATIONS DEVELOPMENT DIVISION



*National Aeronautics and Space Administration*  
**LYNDON B. JOHNSON SPACE CENTER**

*Houston, Texas*  
September 1975

LEC-6995  
Shuttle

121.75 MHz BAND PASS FILTER


Job Order 17-060

PREPARED BY

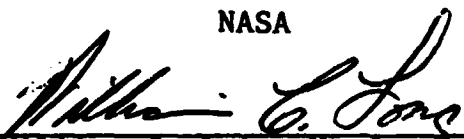
  
R. J. Davis, Project Engineer  
Lockheed Electronics Company, Inc.

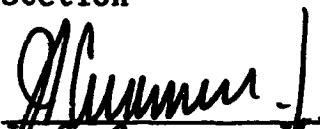
APPROVED BY

LEC

  
A. L. Roelse, Supervisor  
Spacecraft Systems Test  
Section

NASA

  
William C. Long, Head  
Spacecraft Systems Test  
Office

  
J. S. Creamer, Jr., Manager  
Tracking and Communications  
Systems Department

Prepared By

Lockheed Electronics Company, Inc.

For

Spacecraft Systems Test Office

Tracking and Communications Development Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
LYNDON B. JOHNSON SPACE CENTER  
HOUSTON, TEXAS

September 1975

## PREFACE

This report describes the results of tests performed on a 121.75 MHz band pass filter. It is the filter recommended in LEC document 4457 as a solution for the rejection of an interfering signal at 142.417 MHz.

## ACKNOWLEDGEMENTS

This document was prepared in response to Action Document 7060-21-60, submitted by the Spacecraft Systems Test Office (SSTO) of the Tracking and Communications Development Division. William C. Long, Office Head, was the Technical Monitor for this task. Robert J. Davis, of the Spacecraft Systems Test Section, Lockheed Electronics Company, Inc., prepared this document.

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## 1. SUMMARY

Prior to the ASTP joint flight it had been observed during various tests on the USA's VHF/FM system, that the 121.75 MHz receiver unsquelched when exposed to certain rf power levels at a frequency of 142.417 MHz. Consequently, tests were conducted per LEC Document 4457 in an effort to arrive at a solution. Several recommendations were made but the most feasible was to insert a selective band pass filter in the transmit/receive line of the VHF/FM transceiver. The tests shown in Section 2 were performed on the filter to determine the frequency response and rejection capabilities at 142.417 MHz.

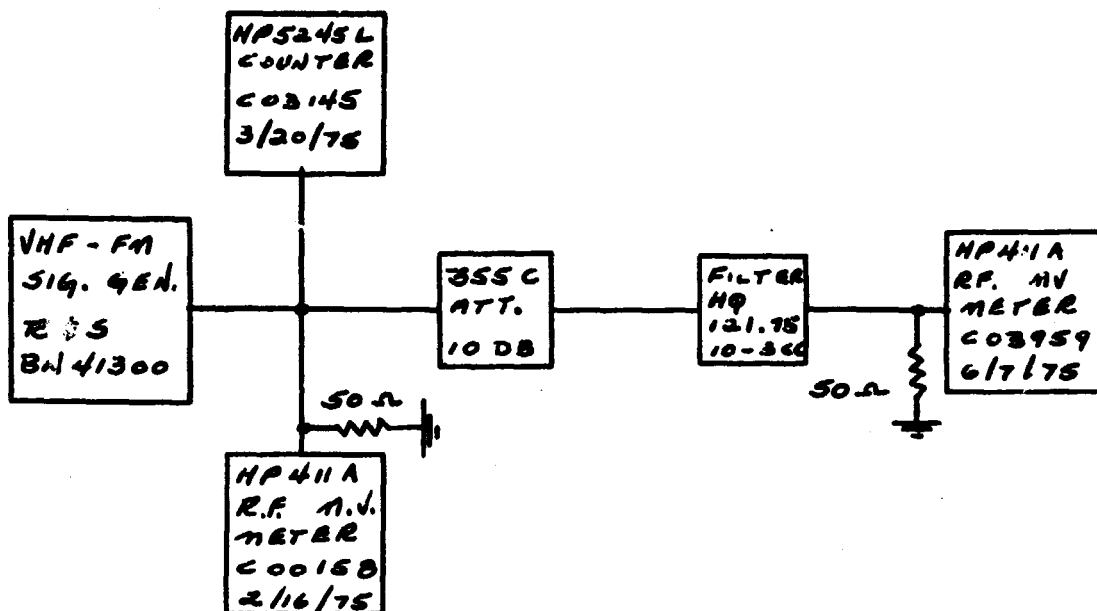
## **2. 121.75 MHz BANDPASS FILTER TEST REPORT**

The test results are shown on the following pages of this section. Ran band pass characteristics of the filter per set up on page 2-2 with resulting data plot on page 2-4.

Also conducted a test with the filter connected in the planned flight position as shown on page 2-8. The resulting plot of unsquelched levels vs frequency shows the rejection capability at 142.417 MHz.



TEST NUMBER <b>020375</b>		SHEET <b>1 OF 3</b>	TEST PROCEDURE NO. <b>PROCEDURE SECTION NO.</b>
RECORDED BY <i>R. J. Denis</i>		TYPE OF TEST AND DATA OUTPUT FORM <b>BANDPASS FILTER HQ 121.75-10-3CL</b>	
APPROVED BY		LARK ENGINEERING	



TEST NUMBER

020375

SHEET

2 OF 3

TEST PROCEDURE NO.

PROCEDURE SECTION NO.

RECORDED BY

R. Davis

TYPE OF TEST

FREQUENCY RESPONSE

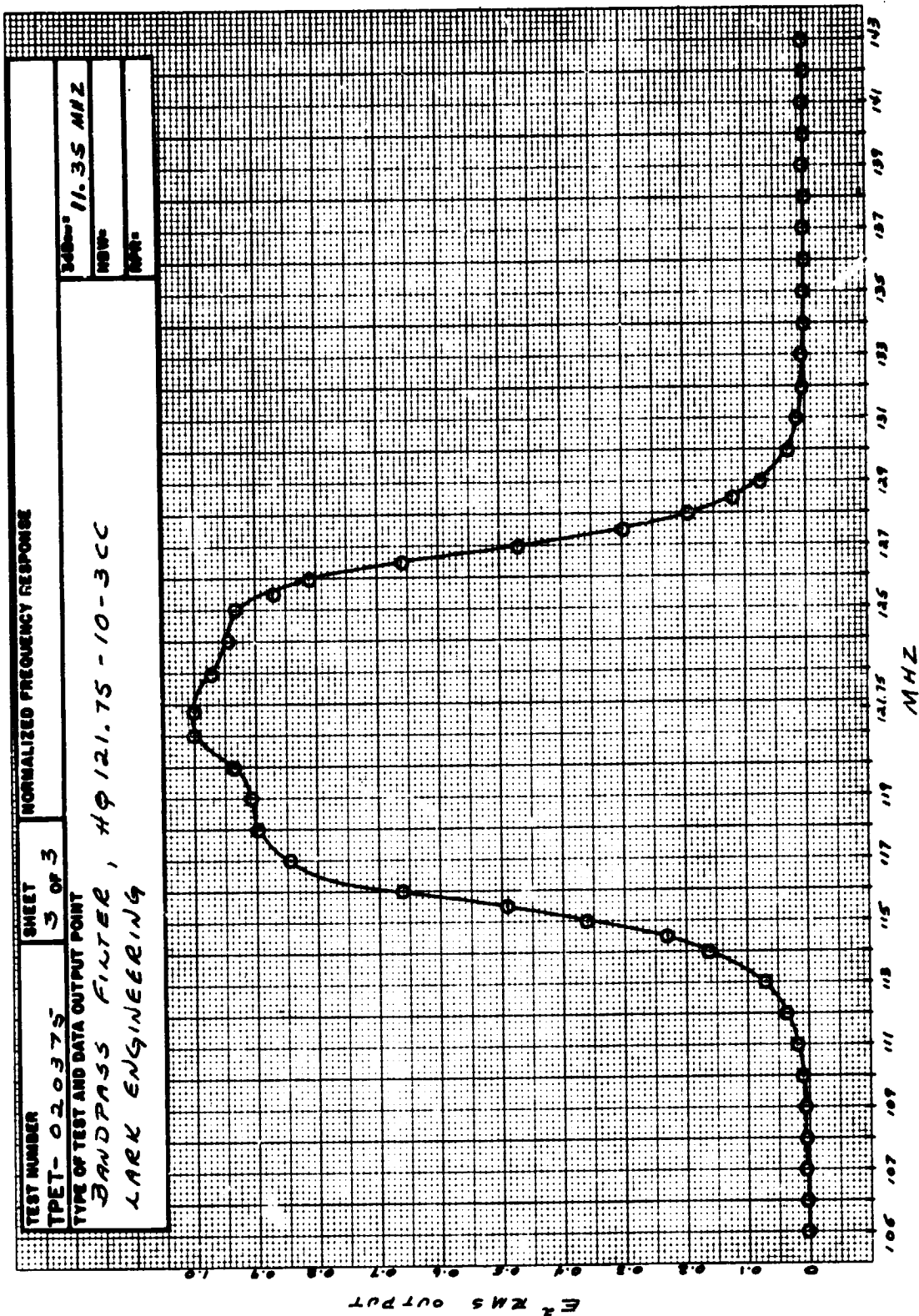
APPROVED BY

BANDPASS FILTER HQ121.75-10-3CC  
LARK ENGINEERING

FREQ. M Hz	E OUTPUT RMS MV	E <sup>2</sup> NORM.		FREQ. M Hz	E OUTPUT RMS MV	E <sup>2</sup> NORM.		FREQ. M Hz	E OUTPUT RMS MV	E <sup>2</sup> NORM.	
105	5.4	.001		125	145	.934		143	1.3	.0000	
106	6.4	.002		126	135	.810		125.5	140	.871	
107	7.6	.003		126.5	122	.661					
108	9.5	.004		127	103	.471					
109	12	.006		127.5	83	.306					
110	15.5	.011		128	66	.194					
111	20.5	.019		128.5	52	.120					
112	28	.035		129	41	.075					
113	40	.071		129.5							
113.5	48	.102		130	26	.030					
114	60	.160		130.5							
114.5	72	.230		131	18	.014					
115	90	.360		132	13	.007					
115.5	105	.490		133	9.5	.004					
116	122	.661		134	7.5	.0025					
117	138	.846		135	5.5	.0013					
118	142	.896		136	4.5	.0009					
119	143	.908		137	3.7	.0006					
120	145	.934		138	3.0	.0004					
121	150	1		139	2.5	.0003					
121.75	150	1		140	2.1	.0002					
123	148	.973		141	1.7	.0001					
124	146	.947		142	1.5	.0001					

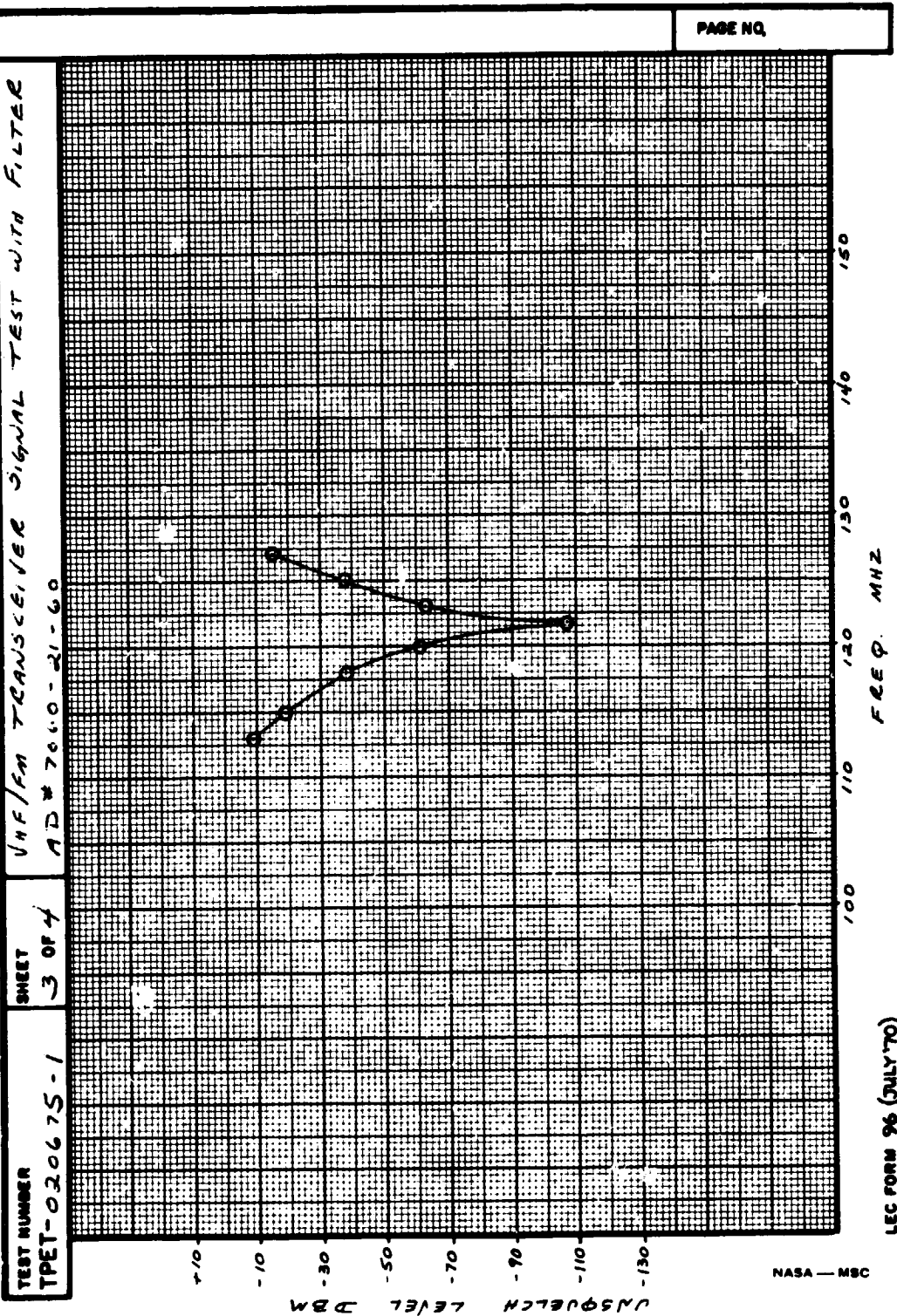
REMARKS:

INSERTION LOSS OF FILTER = 0.7 DB

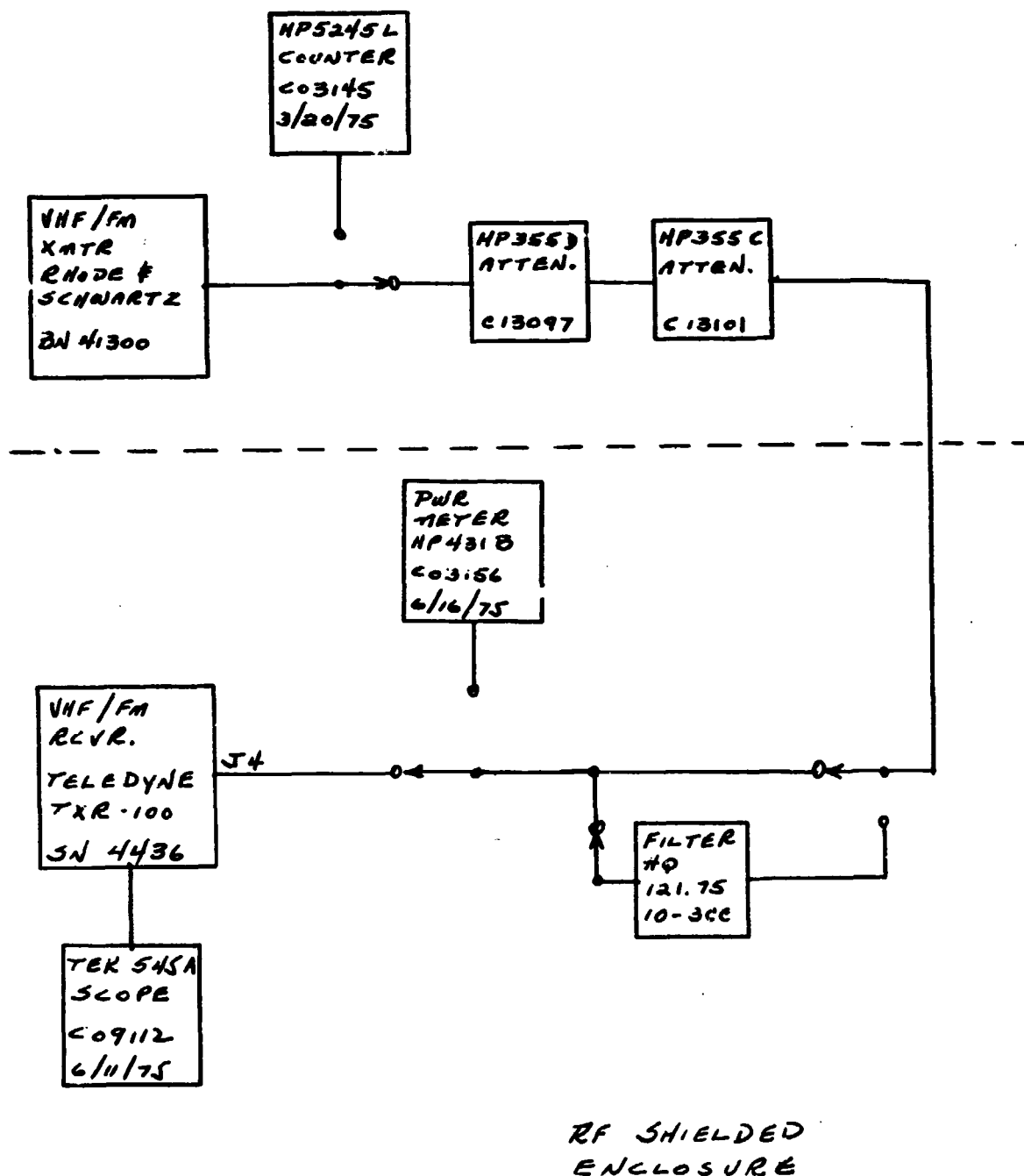


TEST NUMBER 020675-1			SHEET 1 OF 4	TEST PROCEDURE NO. PROCEDURE SECTION NO. AD # 7060-21-60	
RECORDED BY <i>R. Davis</i>			TYPE OF TEST AND DATA OUTPUT POINT VHF/FM TRANSCEIVER SIGNAL TEST WITH FILTER		
APPROVED BY					
FREQ. MHZ	SQUELCH LEVEL DBM	UNSQUELCH LEVEL DBM	FILTER IN		
113	- 11	- 10	No		
113	- 9.7	- 8.7	YES		
115	- 21	- 20	No		
115	- 19.7	- 18.7	YES		
118	- 39	- 38	No		
118	- 38.7	- 37.7	YES		
120	- 62	- 61	No		
120	- 61.7	- 60.7	YES		
121.750	- 108	- 107	No		
121.750	- 107.7	- 106.7	YES		
123	- 63	- 62	No		
123	- 63.7	- 62.7	YES		
125	- 39	- 38	No		
125	- 38.7	- 37.7	YES		
127	- 21	- 20	No		
127	- 15.7	- 14.7	YES		
130	0	+ 1	No		
130		No UNSQUELCH	YES		
131	+ 12	+ 11	No		
131		No UNSQUELCH	YES		
132	+ 2	+ 3	No		
132		No UNSQUELCH	YES		
REMARKS: ① VHF/FM XMT R DEVIATED 10 KHZ WITH 1 KHZ SINE WAVE ② RF POWER INSERTED AT J4 OF VHF/FM RCL R.					

TEST NUMBER 020675-1			SHEET FL OF 4	TEST PROCEDURE NO. PROCEDURE SECTION NO. AD # 7060-21-60	
RECORDED BY <i>R. D. Davis</i>		TYPE OF TEST AND DATA OUTPUT POINT VHF/FM TRANSCEIVER SIGNAL			
APPROVED BY		TEST WITH FILTER			
FREQ. MHZ	SQUELCH LEVEL DBM	UNSQUELCH LEVEL DBM	FILTER IN		
141	+3	+4	No		
141		No UNSQUELCH	YES		
141.500	-3	-2	No		
141.500		No UNSQUELCH	YES		
142	-5	-4	No		
142		No UNSQUELCH	YES		
142.417	-5	-4	No		
142.417		No UNSQUELCH	YES		
142.800		No UNSQUELCH	No		
142.800		No UNSQUELCH	YES		
143		No UNSQUELCH	No		
143		No UNSQUELCH	YES		
143.140	-41	-40	No		
143.140		No UNSQUELCH	YES		
143.150	-44	-43	No		
143.150	+0.7	+1.7	YES		
143.183	-39	-38	No		
143.183		No UNSQUELCH	YES		
143.190	-27	-26	No		
143.190	-7.7	-6.7	YES		
REMARKS:					



		PAGE NO.
TEST NUMBER 020675-1	SHEET 4 OF 4	TEST PROCEDURE NO. AD#7060-21-60 PROCEDURE SECTION NO.
RECORDED BY R. Davis	TYPE OF TEST AND DATA OUTPUT POINT VHF/FM TRANSCEIVER SIGNAL TEST WITH FILTER	
APPROVED BY		



### 3. CONCLUSIONS

The frequency response of the filter shows it to have a 3 dB bandwidth of 11.35 MHz or  $\pm 5.675$  MHz about a center frequency of 121.75 MHz. It also shows the interfering frequency, 142.417 MHz, to be well out of the band pass region.

Unsquench tests were also conducted and the rejection capabilities were more than adequate, especially at the interfering frequency of 142.417 MHz.